

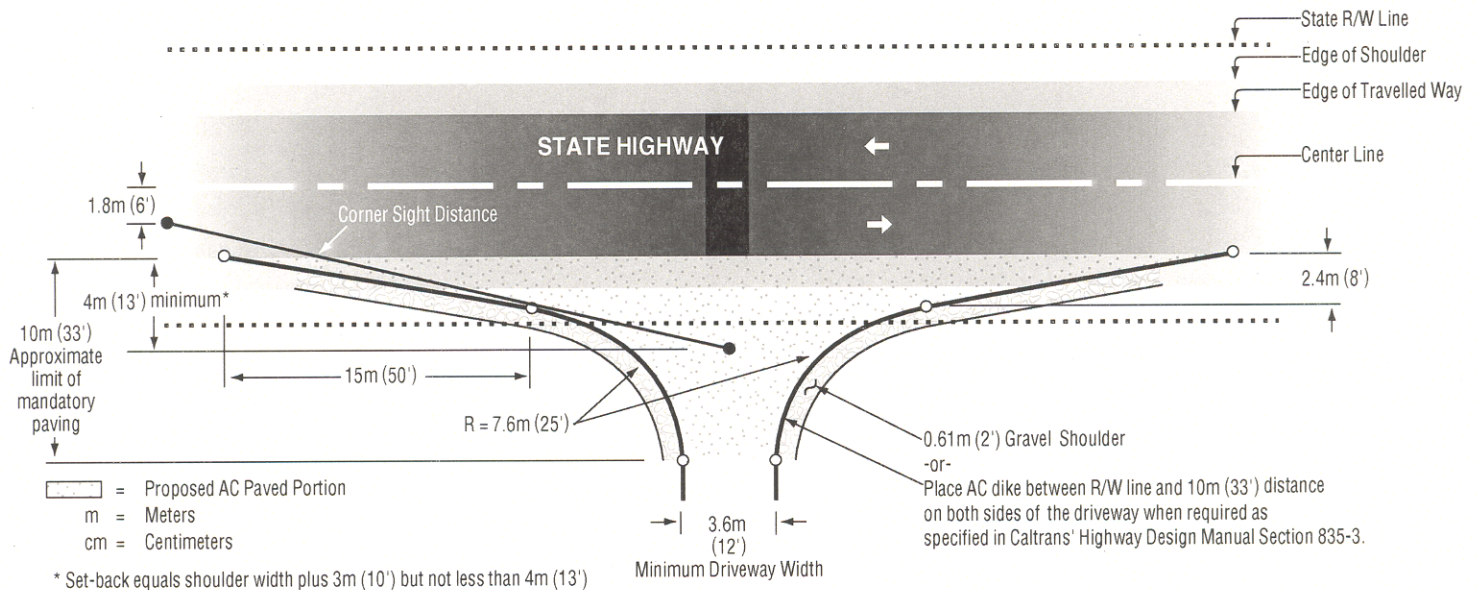


Road Connections and Driveways

Standard Private and Commercial Driveway Approach

For Rural Areas With Unimproved Frontage On Conventional State Highways

(Drawing Not To Scale)



Design Posted Speed mph / km/h	Corner Sight Distance feet / meters
30 / 50	330 / 110
35 / 60	385 / 130
40 / 60	440 / 130
45 / 75	495 / 150
50 / 80	550 / 170
55 / 90	605 / 190
60 / 100	660 / 210
65 / 110	715 / 230
70 / 110	770 / 230

NOTES:

- For driveways constructed with fill slope 4:1 or less and not requiring special drainage design, a 0.61m (2') AB shoulder should be placed on each side.
- Driveway approach within 6m (20') of the traveled way shall have a grade not greater than 5% except that on superelevated curves, the pavement slope shall be continued to the edge of the shoulder.
- Culvert pipe under the driveway approach might be required to carry the State Highway gutter flow.
- Paved portion of driveway shall be surfaced not less than:
 - Private: 7.6cm AC over 15.2cm aggregate base ($3'' \text{ AC} / 6'' \text{ AB}$)
 - Commercial: 10.2cm AC over 15.2cm aggregate base ($4'' \text{ AC} / 6'' \text{ AB}$)

Temporary horizontal clearances less than shown in Table 204.8 or temporary vertical clearances less than 4.6 m should be noted in the PS&E Transmittal Report.

To establish the grade of a structure to be constructed with a falsework opening, allowance must be made for the depth of the falsework. The minimum depths required for various widths of traffic opening are shown in Table 204.8.

Where vertical clearances, either temporary or permanent are critical, the District and the DOS should work in close conjunction during the early design stage when the preliminary grades, structure depths, and falsework depths can be adjusted without incurring major design changes.

Where the vertical falsework clearance is less than 4.6 m, advance warning devices are to be specified or shown on the plans. Such devices may consist of flashing lights, overhead signs, over-height detectors, or a combination of these or other devices.

Warning signs on the cross road or in advance of the previous off-ramp may be required for overheight permit loads. Check with the Regional Permit Manager.

After establishing the opening requirements, a field review of the bridge site should be made by the District designer to ensure that existing facilities (drainage, other bridges, or roadways) will not conflict with the falsework.

The placement and removal of falsework requires special consideration. During these operations, traffic should either be stopped for short intervals or diverted away from the span where the placement or removal operations are being performed. The method of traffic handling during these operations is to be included in the Special Provisions.

Topic 205 - Road Connections and Driveways

205.1 Access Openings on Expressways

Access openings are used only on expressways. The term access opening applies to openings through the right of way line which serve abutting land ownerships whose remaining access rights have been acquired by the State.

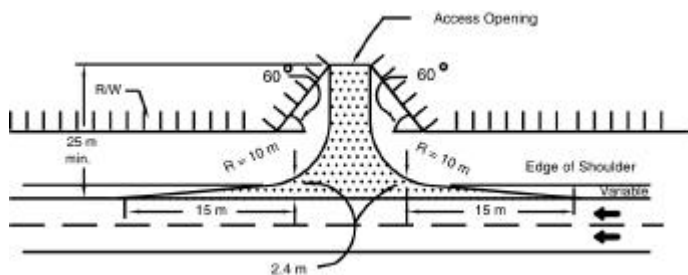
- (1) *Criteria for Location.* Access opening should not be spaced closer than 800 m to an adjacent public road intersection or to another private access opening that is wider than 10 m. When several access openings are closely spaced, a frontage road should be considered (see Index 104.3). To discourage wrong-way movements, access openings should be located directly opposite, or at least 100 m from a median opening.

Sight distance equivalent to that required for public road intersections shall be provided (see Index 405.1).

- (2) *Width.* The normal access opening width should be 10 m. A greater width may result in large savings in right of way costs in some instances, but should be considered with caution because of the possibility that public use might develop. Conversion of a private opening into a public road connection requires the consent of the CTC, which cannot be committed in advance (see the Project Development Procedures Manual).
- (3) *Recessed Access Openings.* Recessed access openings, as shown on Figure 205.1, are desirable at all points where private access is permitted and should be provided whenever they can be obtained without requiring alterations to existing adjacent improvements. When recessed openings are required, the opening should be located a minimum distance of 25 m from the nearest edge of the traveled way.

- (4) *Joint Openings.* A joint access opening serving two or more parcels of land is desirable whenever feasible. If the property line is not normal to the right of way line, care should be taken in designing the joint opening so that both owners are adequately served.
- (5) *Surfacing.* All points of private access should be surfaced with adequate width and depth of pavement to serve the anticipated traffic. The surfacing should extend from the edge of the traveled way to the right of way line.

Figure 205.1
Access Openings on
Expressways



RECESSED OPENING

NOTES:

- By widening the expressway shoulder, deceleration lanes may be provided where justified.
- This detail, without the recess, may be used on conventional highways.

205.2 Private Road Connections

The minimum private road connection design is shown on Figure 205.1. Sight distance requirements for the minimum private road connection are shown on Figure 405.7 (see Index 405.1).

205.3 Urban Driveways

These instructions apply to the design of driveways to serve property abutting on State highways in cities or where urban type development is encountered.

Details for driveway construction are shown on the Standard Plans. For corner sight distance, see Index 405.1(2)(d).

- (1) *Correlation with Local Standards.* Where there is a local requirement regulating driveway construction, the higher standard will normally govern.
- (2) *Driveway Width.* The width of driveways for both residential and commercial usage is measured at the throat, exclusive of any flares. ("W" as shown in Standard Plan A87).
- (3) *Residential Driveways.* The width of single residential driveways should be 3.6 m minimum and 6 m maximum. The width of a double residential driveway such as used for multiple dwellings should be 6 m minimum and 10 m maximum. The width selected should be based on an analysis of the anticipated volume, type and speed of traffic, location of buildings and garages, width of street, etc.
- (4) *Commercial Driveways.* Commercial driveways should be limited to the following maximum widths:
 - (a) When the driveway is used for one-way traffic, the maximum width should be 8 m. If the driveway serves a large parcel, where large volumes of vehicles or large vehicles are expected, the entrance maximum width should be 12 m and the exit maximum width should be 10 m.
 - (b) When the driveway is used for two-way traffic, the maximum width should be 10 m. If the driveway serves a large parcel, where large volumes of vehicles or large vehicles are expected, then the maximum width should be 15 m.

- (c) When only one driveway serves a given property, in no case should the width of the driveway including the side slope distances exceed the property frontage.
 - (d) When more than one driveway is to serve a given property, the total width of all driveways should not exceed 70 percent of the frontage where such a frontage is 30 m or less. Where the frontage is more than 30 m, the total driveway width should not exceed 60 percent of the frontage. In either case, the width of the individual driveway should not exceed those given in the preceding paragraphs. Where more than one driveway is necessary to serve any one property, not less than 6 m of full height curb should be provided between driveways. This distance between driveways also applies to projects where curbs and gutters are not to be placed.
 - (e) Certain urban commercial driveways may need to accommodate the maximum legal vehicle. The width will be determined by the use of truck turn templates.
- (5) *Surfacing.* Where curbs, gutters, and sidewalks are to be placed, driveways should be constructed of portland cement concrete. Where only curbs and gutters are to be placed and pedestrian traffic or adjacent improvements do not warrant concrete driveway construction, the driveway may be paved with the same materials used for existing surfacing on the property to be served.
- (6) *Pedestrian and Disabled Persons Access.* Where sidewalks traverse driveways, accessibility regulations require that a relatively level (2% max. cross fall) path, at least 1.22 m wide, is provided. Provision of this feature, as indicated in the Standard Plans, may require the acquisition of a construction easement or additional right of way. Assessment of these needs must be performed early enough in the design to allow time for acquiring any necessary permits or

right of way. Additionally, designers should consider the following:

- Where restricted parking zones have been established (either blue or white painted zones) adjacent to driveways, but no reasonably close ramp access to the sidewalk exists, consideration should be given to reducing the maximum slope of the driveway from 10% to 8.33% to provide sidewalk access to the disabled.
- In many cases providing the pathway along the back of the driveway will lower the elevation at the back of the sidewalk. Depending on grades behind the sidewalk the potential may exist for roadway generated runoff to enter private property. The need for features such as low berms within the construction easement, or installation of catch basins upstream of the driveway should be determined.

When pedestrian activity is neither present, nor expected to be present within the reasonable future, the designer may develop driveway details that eliminate the flatter portion along the back edge in lieu of using the Standard Plans for driveways. Refer to Topic 105 for additional information related to pedestrian facilities.

205.4 Driveways on Frontage Roads and in Rural Areas

On frontage roads and in rural areas where the maximum legal vehicle must be accommodated, standard truck-turn templates should be used to determine driveway widths where the curb or edge of traveled way is so close to the right of way line that a usable connection cannot be provided within the standard limits.

Where county or city regulations differ from the State's, it may be desirable to follow their regulations, particularly where jurisdiction of the frontage road will ultimately be in their hands.

Details for driveway construction are shown on the Standard Plans. For corner sight distance, see Index 405.1(2)(c).

205.5 Financial Responsibility

Reconstructing or relocating any access openings, private road connections, or driveways required by revisions to the State highway facility should be done at State expense by the State or its agents. Reconstruction or relocation requested by others should be paid for by the requesting party.

Topic 206 - Pavement Transitions

206.1 General Transition Standards

Pavement transition and detour standards should be consistent with the section having the highest design standards. The transition should be made on a tangent section whenever possible and should avoid locations with horizontal and vertical sight distance restrictions. Whenever feasible, the entire transition should be visible to the driver of a vehicle approaching the narrower section. The design should be such that intersections at grade within the transition area are avoided. For decision sight distance at lane drops, see Index 201.7.

206.2 Pavement Widening

- (1) *Through Lane Additions.* Where through lanes, climbing lanes, or passing lanes are added, the minimum recommended distance over which to transition traffic onto the additional width is 75 m per lane. Figure 206.2 shows several examples of acceptable methods for adding a lane in each direction to a two-lane highway.
- (2) *Turning, Ramp, and Speed Change Lanes.* Transitions for lane additions, either for left or right turns or to add a lane to a ramp, should typically occur over a length of 35 m. Lengths shorter than 35 m are acceptable where design speeds are below 75 km/h or for conditions as stated in Index 405.2(2)(c).

Where insufficient median width is available to provide for left turn lanes, through traffic will have to be shifted to the outside. See Figures 405.2A, B and C for acceptable methods of widening pavement to provide for median turn lanes.

- (3) *Lane Widening.* An increase in lane width can occur at short radius curves which are widened for truck off-tracking, at ramp terminals with large truck turning volumes, or when new construction matches existing roadways with narrow lane widths. Extensive transition lengths are not necessary as the widening does not restrict the drivers expectations. Transition tapers for these types of situations should be at 10:1.
- (4) *Shoulder Widening.* Shoulder widening should normally be accomplished in a manner that provides a smooth transition, but can be accomplished without a taper if necessary.

206.3 Pavement Reductions

- (1) *Through Lane Drops.* When a lane is to be dropped, it should be done by tapering over a distance equal to $(2/3)WV$, where W = Width of lane to be dropped and V = Design Speed. In general, the transition should be on the right so that traffic merges to the left. Figure 206.2 provides several examples of acceptable lane drops at 4-lane to 2-lane transitions. The exception to using the $(2/3)WV$ criteria is for the lane drop/freeway merge movement on a branch connection which is accomplished using a 50:1 taper.
- (2) *Ramp and Speed Change Lanes.* As shown in Figures 504.2A and 504.3C, the standard taper for a ramp merge into a through traffic lane is 50:1. Where ramp lanes are dropped prior to the merge with the through facility, the recommended taper is 50:1 for design speeds over 75 km/h, and the taper distance should be equal to $(2/3)WV$ for speeds below 75 km/h.

The "Ramp Meter Design Guidelines" also provide information on recommended and minimum tapers for ramp lane merges. These guideline values are typically used in retrofit or restricted right-of-way situations, and are acceptable for the specific conditions stated in the guidelines.

Figure 206.2
Typical Two-lane to Four-lane Transitions

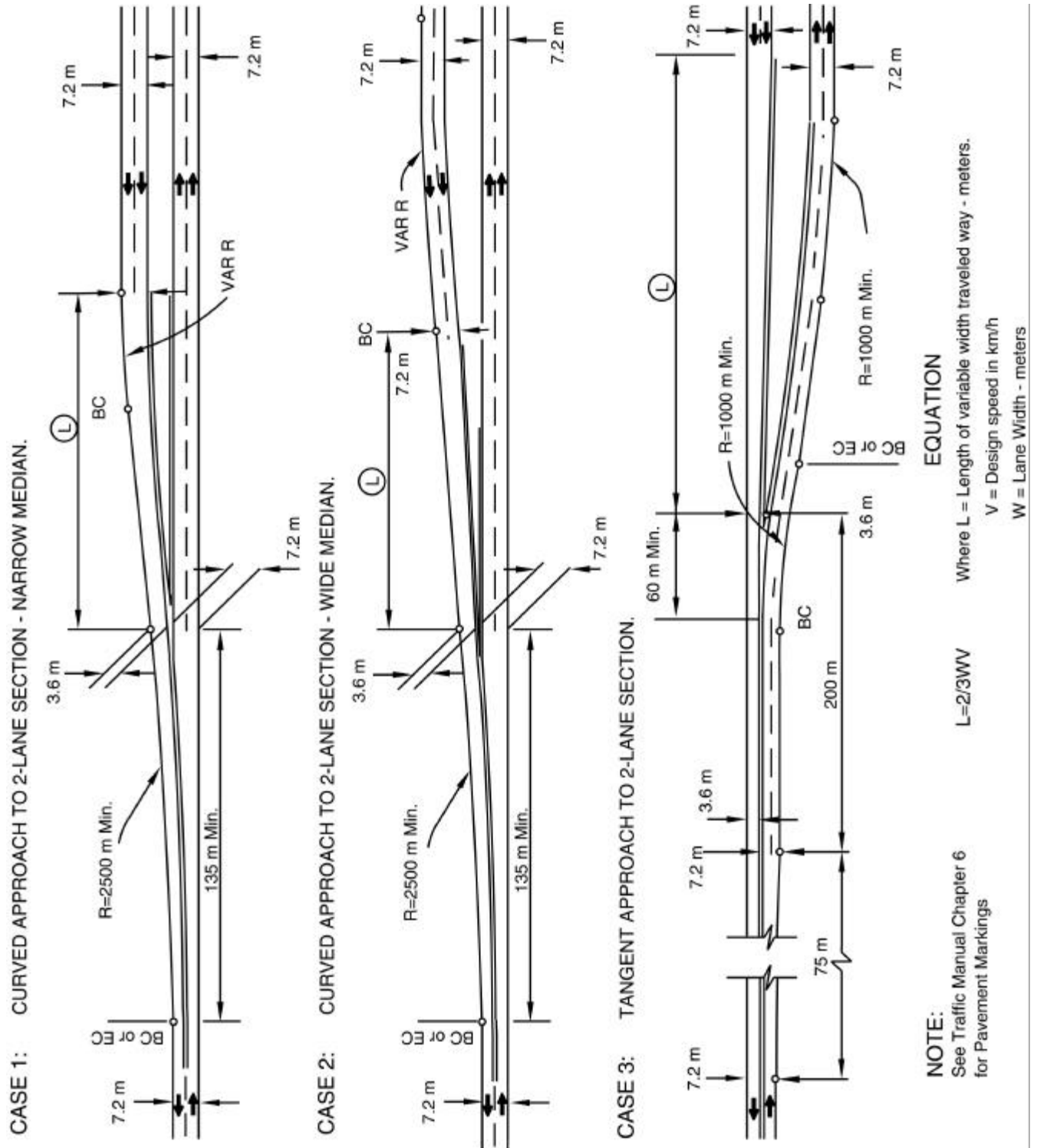


Figure 405.9 shows the standard taper to be used for dropping an acceleration lane at a signalized intersection. This taper can also be used when transitioning median acceleration lanes.

Figures 405.2A, B and C show the recommended methods of transitioning pavement back into the median area on conventional highways after the elimination of left turn lanes.

- (3) *Lane Reductions.* At any location where lane widths are being reduced, the minimum length over which to accomplish the transition should be equal to $(2/3)WV$. See Index 504.6 for mainline lane reductions at interchanges.
- (4) *Shoulder Reduction.* Shoulder reductions should typically occur over a length equal to $WV/2$. However, when shoulder widths are being reduced in conjunction with a lane addition or widening (as in Alt. A of Figure 504.3B), the shoulder reduction should be accomplished over the same distance as the addition or widening.

206.4 Temporary Freeway Transitions

It is highly desirable that the design standards for a temporary transition between the end of a freeway construction unit and an existing highway should not change abruptly from the freeway standards. Temporary freeway transitions must be reviewed by the Project Development Coordinator.

Topic 207 - Airway-Highway Clearances

207.1 Introduction

- (1) *Objects Affecting Navigable Airspace.* An object is considered an obstruction to air navigation if any portion of that object is of a height greater than the approach and transverse surfaces extending outward and upward from the airport runway. These objects include overhead signs, light standards, moving vehicles on the highway

and overcrossing structures, and equipment used during construction.

- (2) *Reference.* The Federal Aviation Administration (FAA) has published a Federal Aviation Regulation (FAR) relative to airspace clearance entitled, "FAR Part 77, Obstructions Affecting Navigable Airspace", dated March, 1993. This is an approved reference to be used in conjunction with this manual.

207.2 Clearances

- (a) Civil Airports--See Figure 207.2A.
- (b) Heliports--See Figure 207.2B.
- (c) Military Airports--See Figure 207.2C.
- (d) Navy Carrier Landing Practice Fields--See Figure 207.2D.

207.3 Submittal of Airway-Highway Clearance Data

The following procedure must be observed in connection with airway-highway clearances in the vicinity of airports and heliports.

Notice to the FAA is required when highway construction is planned near an airport (civil or military) or a heliport. A "Notice of Proposed Construction or Alteration" should be submitted to the FAA Administrator when required under criteria listed in Paragraph 77.13 of the latest Federal Aviation Regulations, Part 77. Such notice should be given as soon as highway alignment and grade are firmly established. It should be noted that these requirements apply to both permanent objects and construction equipment. When required, four copies of FAA Form 7460-1, "Notice of Proposed Construction", and accompanying scaled maps must be sent to the FAA, Western-Pacific Regional Office, Chief-Air Traffic Division, AWP-520, 15000 Aviation Boulevard, Hawthorne, CA 90260. Copies of FAA Form 7460-1 may be obtained from the FAA, Western-Pacific Regional Office or Caltrans, Division of Aeronautics.